To Ensure the Integrity of the Cryogenic Propellant Depot Tank Within the Expected Radiation and Space Debris Environment, Phase II

Completed Technology Project (2005 - 2007)

Project Introduction

HyPerComp Engineering, Inc. (HEI) proposes to develop well characterized, structurally reliable filament wound composite pressure vessels for use in both cryogenic and radiation environment applications. The intent of the proposed effort is to develop the detailed pressure vessel performance characteristics that will result in "off the shelf' technology for high performance cryogenic/ radiation environment composite pressure vessels. This intent will be achieved via empirical characterization of composite raw materials subsequent to exposure to the aforementioned environments. Phase I of this effort (NASA contract #NNM05AA45C) demonstrated a significant reduction in structural performance subsequent to exposure to cryogenic/radiation environments. This reduction in structural performance would seriously compromise the structural performance of any composite structure. The aerospace and the commercial communities have shown significant interest in using filament wound composite pressure vessels for cryogenic applications. In addition there is serious consideration for using composite vessels in deep space exploration which would sustain significant radiation exposure. The Phase I investigation has shown that these environments significantly degrade the structural capability of these vessels. Constituent raw materials and existing pressure vessel designs have not been characterized for these applications and as such the safety margins for these applications are undefined. Therefore, the reliability of such usage is unknown. HEI has recently completed a Phase I SBIR through NASA/MSFC. This successful effort demonstrated a significant degradation in composite pressure vessel cryogenic/radiation performance. The effort proposed herein builds upon that knowledge, significantly expands it, and will result in statistically meaningful and, therefore, reliable "off the shelf" technology for composite pressure vessels in cryogenic/radiation applications.

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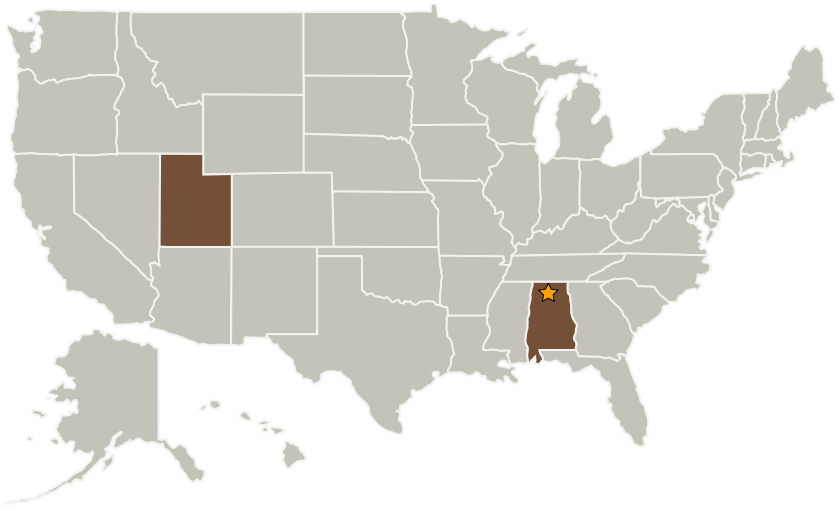
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
HyPerComp Engineering, Inc.	Supporting Organization	Industry	Brigham City, Utah

Primary U.S. Work Locations	
Alabama	Utah

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.1 In-space Propellant Storage & Utilization